

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-059559

(43)Date of publication of application : 26.02.2002

(51)Int.Cl.

B41J 2/165

B41J 2/21

B41J 2/18

B41J 2/185

(21)Application number : 2000-246095

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(22)Date of filing : 14.08.2000

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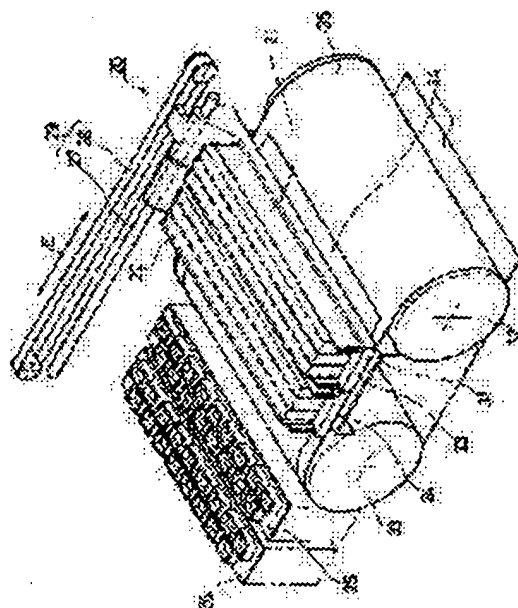
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(54) COLOR INK JET PRINTER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a color ink jet printer capable of reducing a quantity of ink ejected by priming in such a manner that ejection nozzles for a non-used color is capped even during the operation of printing.

SOLUTION: A paper sheet 34 is inserted from a lower section to be conveyed in the left side by being attracted to a conveyance belt 35 and is reversed by a following roller 33. After that, the paper sheet 34 is printed by passing through a platen 31 to be discharged to the outside. In the case of monochrome printing, a color print head unit 22 is moved to a maintenance position at the left side by a sliding mechanism 29 and is covered with a cap member 26 for the color print head unit 22 to be stopped and then a black color print head unit 21 is positioned opposite the platen 31 to form a black color image on the paper sheet 34. During the printing, the priming of the color print head unit 22 is not executed. In the case of color printing, the black color print head 21 and the color print head unit 22 are supported by head unit holders 23, 24 to be positioned opposite the platen 31 and then a full-color image is formed on the paper sheet 34 by inks of yellow, cyan, magenta and black colors ejected from the print heads.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the
examiner's decision of rejection or application
converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of
rejection]

[Date of requesting appeal against examiner's decision
of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] The cap member the black print head which carries out the regurgitation of the black ink, and for the black print heads put on the ink regurgitation side of this black print head free [attachment and detachment], The color print head which carries out the regurgitation of yellow, a Magenta, and each color ink of cyanogen at least, It has the cap member for color print heads put on the ink regurgitation side of this color print head free [attachment and detachment]. Said black print head or said color print head. The color ink jet printer with which it prints where discharging of said cap member corresponding to self is carried out at the time of each printing activation, and another side is characterized by putting said cap member corresponding to [it is not scrupulous nothing and] self which is [printing] under activation at the time of each printing un-performing.

[Claim 2] Both said black print head and said color print head are a color ink jet printer according to claim 1 characterized by being the print head equipped with the regurgitation nozzle train corresponding to the printing area width-of-face whole region for Rhine style printing.

[Claim 3] It is the color ink jet printer according to claim 1 or 2 which the cap member for said black print heads and the cap member for said color print heads are fixed to the maintenance location which performs maintenance processing, respectively, and is characterized by what is arranged free [migration between the printing location which prints by said black print head and said color print head countering a form, respectively, and said maintenance location where said cap member corresponding to self is put].

[Claim 4] It is the color ink jet printer according to claim 1 or 2 which the cap member for said black print heads and the cap member for said color print heads are arranged in an evacuation location free [migration] at the time of the maintenance location and printing which perform maintenance processing, and is characterized by what is arranged free [migration between the printing location which prints by said black print head and said color print head countering a form, respectively, and said maintenance location].

[Claim 5] Said black print head is fixed to the printing location which prints by countering a form. Said color print head is arranged free [migration] between a printing location and the maintenance location which performs maintenance processing. The cap member for said black print heads is arranged in the head discharging evacuation location at the time of printing, and the covering location to said black print head to which it was fixed at the time of un-printing free [migration]. The cap member for said color print heads is a color ink jet printer according to claim 1 characterized by what is arranged free [migration in the head discharging evacuation location at the time of printing, and the covering location to said color print head in the maintenance location at the time of un-printing].

[Claim 6] Said maintenance processing is a color ink jet printer according to claim 3, 4, or 5 characterized by including the processing which performs either or all of capping as processing for maintaining proper discharging performance, wiping, and a priming.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Even if other regurgitation nozzles are printing this invention, it relates to the color ink jet printer which capping of the regurgitation nozzle of a non-used color was carried out [ink jet printer], and reduced the amount of regurgitation ink of a priming.

[0002]

[Description of the Prior Art] Conventionally, the ink jet printer is used. The printing approach in this ink jet printer makes the drop of ink breathe out from the regurgitation nozzle of a print head, makes recorded materials, such as paper and cloth, absorb this ink droplet, and prints an alphabetic character, an image, etc. (printing). This printing method has little generating of the noise, without requiring special fixing processing, moreover high-speed printing can be performed and full color printing is also the possible printing approach.

[0003] In full color printing, it usually prints using the ink of four colors which added the black (black) used for an alphabetic character, the black part of an image, etc. in the ink of three colors of the yellow (yellow) which is subtractive primary colors, a Magenta (red color name), and cyanogen (blue with greenishness). That is, arranging the nozzle train only for [each] colors in one print head, and controlling the discharge quantity of each color for the ink of four colors of yellow, a Magenta, cyanogen, and black from these nozzle trains, 1 pixel of discharge, for example, a recorded material, is made to carry out mixed absorption of each ink, and full color printing is performed to it.

[0004] In the print head of an ink jet printer which makes an ink droplet breathe out from the above-mentioned regurgitation nozzle The ink pressurized room formed minutely is made to produce the pressure by the mechanical deformation using electric machine sensing elements, such as a piezo-electric element. The print head of a piezo type ink jet printer which makes an ink droplet breathe out from a minute regurgitation nozzle with this supersensitive pressure, A resistance heater element is allotted to a detailed ink pressurized room, an electric pulse is given to this, heating foaming of the ink is carried out at high speed, and there is a print head of the thermal type ink jet printer made to breathe out using the growth force of the air bubbles.

[0005] Drawing 11 (a) It is the top view showing the ink regurgitation side of the print head of the roof shooter mold in such a thermal type, and is this drawing (b). It is the rear view. Moreover, this drawing (c) This drawing (a) It is the enlarged drawing in which seeing through the top plate of the part squarely surrounded with the broken line a, and showing the interior, and is this drawing (d). This drawing (c) It is an A-A' cross-section view Fig.

[0006] This drawing (a) The shown print head 1 is 4 train preparation ***** about the nozzle train 2 on one chip substrate. The nozzle train 2 of these 4 train is equipped with many regurgitation nozzles 3, respectively, and it consists of these regurgitation nozzles 3 so that the regurgitation of the ink droplet of yellow ink (Y), Magenta ink (M), cyanogen ink (C), or black ink (K) may be carried out every nozzle train 2.

[0007] This drawing (a) - (d) The drive circuit 5 is formed in the top face of the chip substrate 4 by the LSI formation processing technique, it is punctured by sandblasting and, as for the print head 1, the ink feed holes 7 penetrated at the rear face of the chip substrate 4 from the base of this ink supply slot 6 are formed for the ink supply slot 6 so that it may be shown.

[0008] Between the above-mentioned drive circuit 5 and the ink supply slot 6, the heater element by the common electrode 9 and the individual wiring electrode 11 which were connected to the exoergic section 8 of an exoergic resistor and the both ends of this exoergic section 8 is formed by thin film coating technology, such as sputtering, mask

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pattern formation techniques, such as photolithography, and patterning techniques, such as etching. Although this heater element is based also on the plan on a design, a large number formation of 64 pieces, 128 pieces, the 256 etc. pieces, etc. is carried out. Furthermore, the circuit electrode terminal 5-1 of the drive circuit 5 is connected to these individual wiring electrodes 11, and the electrode terminal 12 for connection with the exterior is formed in the edge of the upper and lower sides of chip substrate 4 top face.

[0009] And on these, the laminating of the septum 13 (13-1, 13-2, 13-3) is carried out all over removing the electrode terminal 12 above-mentioned part for connection. A septum 13 forms the batch septum 13-3 which begins to be further extended between each exoergic section 8 and the exoergic section 8 from the seal septum 13-2 of this individual wiring electrode 11 part while it forms the seal septum 13-1 which intercepts ink from the outside to the left of the ink supply slot 6 by one side and forms the seal septum 13-2 which intercepts ink from the outside on the individual wiring electrode 11 and the drive circuit 5 on the other hand.

[0010] 13 to batch septum 3 part which begins to be extended between each exoergic section 8 the drum of a comb, then after this in 13 to seal septum 2 part on the individual wiring electrode 11 of the above-mentioned septum 13 and the drive circuit 5 is making the configuration equivalent to the gear tooth of a comb. The ink pressurized room 14 of the typeface (refer to this drawing (c)) of KO where the cross section where the exoergic section 8 has been arranged is detailed is formed in the root part between the gear teeth of this comb only for the number of the exoergic sections 8. And the ink passage 15 is formed between these ink pressurized room 14 and the ink supply slot 6.

[0011] Furthermore, the laminating of the top plate 16 is carried out after these configurations, many regurgitation nozzles 3 mentioned above are drilled in the location which counters at the above-mentioned exoergic section 8 of the top plate 16, and it is drawing 6 (a). The nozzle train 2 of four shown trains is formed. A print head 1 is completed, respectively on the chip substrate 4 of a large number currently formed on the non-illustrated silicon wafer in such a configuration. And a dicing saw etc. is used, finally a silicon wafer, and it separates according to an individual every chip substrate 4, and die bonding is carried out to a mounting substrate, terminal strapping is carried out to it, and the print head module of a practical unit is completed.

[0012] The ink in which this print head 1 is supplied to the external ink feed holes 7 from an ink cartridge etc. is supplied to the ink pressurized room 14 through the ink supply slot 6 and the ink passage 15. On the occasion of printing, the exoergic section 8 energizes alternatively according to printing information, generate heat in an instant, the interface of the exoergic section 8 and ink is made to generate a film-boiling phenomenon, and an ink droplet is breathed out by the growth pressure of the film air bubbles from the regurgitation nozzle 3 corresponding to the exoergic section 8. An ink droplet serves as a printing dot of the magnitude of a twice as many diameter as ****, and reaches the target on non-illustrated space. An image is formed in a form side of this.

[0013] By the way, in the manufacturing technology of the above-mentioned print head, since various limitations were in a processing technique (mainly processing equipment), the above-mentioned print head 1 was conventionally used for the serial type printer chiefly difficultly [making the print head of the long long picture of a nozzle train] therefore.

[0014] the head unit in which the print head 1 was mounted equips carriage with a serial type printer with an ink cartridge -- having -- a printing main scanning direction (drawing 11 (a) --) (b) It is what carries out both-way migration at a longitudinal direction, and prints by breathing out ink from the regurgitation nozzle 3 to the form by which intermittent conveyance is carried out in the both-way migration direction of this carriage, and the direction which intersects perpendicularly (printing). Since it is [that it can miniaturize cheap comparatively and] convenient, the price is widely used as a personal printer.

[0015] However, it has the problem that it is convenient small in this way and that it cannot print at a high speed since a serial type printer has the narrow width of face which can be printed at once. Moreover, though a print head with a long nozzle train is moved temporarily, since the load at the time of a print head moving becomes large and troublesome various problems, such as degradation of the quality of printed character by vibration, strengthening of a frame, and enlargement of equipment, occur, it is not practical.

[0016] Generally, a printer is divided roughly and has a Rhine style printer other than the above-mentioned serial type printer. A Rhine style printer is a method which fixes the print head to the body side of a printer, and conveys only a form using the print head which arranged and long-picture-ized the printing component to the limit of the printing area of a main scanning direction, and since mechanical movement is only conveyance of a form, the load of a drive system is small, and there is little power consumption, and it is economical.

[0017] Moreover, a Rhine style printer is a printer corresponding to rapidity in the method itself. Therefore, in order to meet the request of wanting to make the rate of printing processing into a high speed more, like recent years, the direction of a Rhine style printer takes the lead in future development from a serial-type printer.

[0018] Drawing 12 is drawing showing typically the configuration of the color print head of such a Rhine style printer. As shown in this drawing, the color print head 17 extends in the printing main scanning direction shown by the arrow head B of drawing, and much element chips 18 (the same thing as the print head 1 of drawing 11) are arranged in the shape of an alternate pattern alternately on the parent substrate 19 (staggered arrangement), and it forms the printing area of die-length C in a main scanning direction.

[0019] By the way, it sets to the print head of the above ink jet methods. Since the use pause of the body of a printer may be carried out or the long time amount ink regurgitation may not be performed depending on a regurgitation nozzle while in use The moisture of the ink in the regurgitation nozzle which was not used for printing evaporates, the viscosity of ink rises, and there is a possibility that there may be some which start blinding in many regurgitation nozzles and have become the poor regurgitation.

[0020] Therefore, in order to cancel this blinding that may have been generated that is, wiping which is eradication processing of the ink regurgitation side by the wiping member, and the priming which is air ejecting processing (regurgitation of ink without printing) of the ink by all regurgitation nozzles are periodically performed for regurgitation functional recovery.

[0021] Moreover, at the time of un-using [of a print head] it, as much as possible, desiccation prevention devices, such as capping of a print head, are established so that the above blinding by desiccation of an ink regurgitation nozzle may not occur.

[0022]

[Problem(s) to be Solved by the Invention] By the way, generally, a printer may not say that sole possession is taken by color printing just because it is a color printer, and it may be used for black printing like addressing name writing of creation of a document, or mail. When using a printer especially for a business application, the ratio in the case of outputting by black printing becomes high. It is drawing 11 (a) at the time of such black printing. The nozzle train of the shown black ink (K) of a print head 1 was used, and the nozzle train of color ink, such as cyanogen ink for color printing (C), Magenta ink (M), and yellow ink (Y), is stopped.

[0023] However, although it has stopped, since it is exposed during the open air with the nozzle train of black ink, the nozzle train of the color ink for these color printings needs to perform a priming, in order to prevent desiccation like the nozzle train of black ink. That is, un-arranging [of being consumed without presenting printing whenever color ink is a priming] occurs. Un-arranging [of the same being said of the case of color printing performed only in the ink of three colors of yellow, a Magenta, and cyanogen not using black ink, and being consumed, without presenting printing whenever black ink is a priming in that case] generates this.

[0024] In the case of a Rhine style printer as shown especially in drawing 12, since there are many regurgitation nozzles per color, the discharge quantity by the priming of the ink of the color which is not used increases, and a serious problem is posed. The technical problem of this invention is being able to reduce sharply the amount of ink consumed by the recovery regurgitation in view of the above-mentioned conventional actual condition, and offering an advantageous color ink jet printer in respect of a running cost.

[0025]

[Means for Solving the Problem] The black print head to which the color ink jet printer of this invention carries out the regurgitation of the black ink, The cap member for black print heads put on the ink regurgitation side of this black print head free [attachment and detachment], The color print head which carries out the regurgitation of yellow, a Magenta, and each color ink of cyanogen at least, It has the cap member for color print heads put on the ink regurgitation side of this color print head free [attachment and detachment]. The above-mentioned black print head or the above-mentioned color print head It prints, where discharging of the above-mentioned cap member corresponding to self is carried out at the time of each printing activation, and at the time of each printing un-performing, it is constituted so that the cap member above-mentioned [corresponding to / it is not scrupulous nothing and / self] with which another side is printing performing may be put.

[0026] The above-mentioned black print head and the above-mentioned color print head are print heads for Rhine style printing equipped with the regurgitation nozzle train according to claim 2 corresponding to [like] both the printing area width-of-face whole region, for example. And it is fixed to the maintenance location according to claim 3 whose

cap member for the above-mentioned black print heads and cap member for the above-mentioned color print heads perform maintenance processing like, respectively, for example, and the above-mentioned black print head and the above-mentioned color print head are arranged free in migration between the printing location which prints by countering a form, respectively, and the above-mentioned maintenance location where the above-mentioned cap member corresponding to self is put.

[0027] Moreover, it is arranged in an evacuation location free [migration], for example at the time of the maintenance location according to claim 4 whose cap member for the above-mentioned black print heads and cap member for the above-mentioned color print heads perform maintenance processing like, and printing, and the above-mentioned black print head and the above-mentioned color print head may be made it being arranged between the printing location which prints by countering a form, respectively, and the above-mentioned maintenance location free in migration.

[0028] Moreover, it is fixed to the printing location according to claim 5 which prints by the above-mentioned black print head countering a form like, for example. The above-mentioned color print head is arranged free [migration] between a printing location and the maintenance location which performs maintenance processing. The cap member for the above-mentioned black print heads is arranged in the head discharging evacuation location at the time of printing, and the covering location to the above-mentioned black print head to which it was fixed at the time of un-printing free [migration]. The cap member for the above-mentioned color print heads may be made to be arranged free [migration] in the head discharging evacuation location at the time of printing, and the covering location to the above-mentioned color print head in the maintenance location at the time of un-printing].

[0029] In addition, as for the above-mentioned maintenance processing, it is desirable to make it include the processing which performs either or all of capping according to claim 6 as processing for maintaining proper discharging performance like, wiping, and a priming, for example.

[0030] *Gestalt 2123 25 26*

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing. Drawing 1 is the perspective view showing typically the configuration of a Rhine style ink jet printer (only henceforth a line printer) as a gestalt of the 1st operation. As shown in this drawing, this line printer 20 is equipped with the head unit holder 23 for black holding the black print head unit 21, the color print head unit 22, and the black print head unit 21, the head unit holder 24 for colors holding the color print head unit 22, the cap member 25 for black print heads arranged in the maintenance location, and the cap member 26 for color print heads similarly arranged in the maintenance location.

[0031] Moreover, the line printer 20 is equipped with the sliding mechanism 29 which consists of the guide shaft 27 which slides two more head unit holders 24- [23 and] 21, i.e., a black print head unit, and the color print head unit 22 on above maintenance location and printing location as the both-directions arrow head E of drawing shows, and a driving belt 28.

[0032] In addition, although the head unit holder 23 for black is engaging with the sliding mechanism 29, the head unit holder 24 for colors does not engage with a sliding mechanism 29, but is engaging with the head unit holder 23 for black. That is, the head unit holder 23 for black is actively arranged to the head unit holder 24 for colors, and the color print head unit 22 is passively arranged to the head unit holder 23 for black.

[0033] And the platen 31 which countered the black print head unit 21 and the color print head unit 22 which are held in the printing location which shows a line printer 20 in this drawing further at two head unit holders 23 and 24, and has been arranged, the driving roller 32 arranged at the both sides of this platen 31 and the follower roller 33, and the list were built between these driving rollers 32 and follower 33, and it has the form conveyance belt 35 which adsorbs a form 34 electrostatic and conveys it.

[0034] Drawing 2 is the decomposition perspective view of the above-mentioned black print head unit 21. In addition, the color print head unit 22 is also the same configuration. As shown in this drawing, the black print head unit 21 (or color print head unit 22) FPC36 which it has [FPC] opening arranged in the shape of a reel, and had much wiring connection pad sections arranged to the both ends of this opening (flexible substrate), The plate 37 for the -cum-positioning immobilization for FPC reinforcement which has the notching section arranged in the shape of a reel as well as the location corresponding to opening of this FPC36, The element chip 38 of two or more (the example of drawing 17 pieces) by which inserts in the above-mentioned notching section of this plate 37, turns an ink regurgitation side downward, and positioning immobilization is carried out at a precision, The adhesion pad 42 which equipped with the free passage hole 41 the location corresponding to the ink feed holes 39 which carry out opening to the tooth back

of these element chips 38, It changes from the ink tank 44 which supplies ink to the ink passage member 43 equipped with two or more ink passage (this example 3) which supplies ink to the ink feed holes 39 of the element chip 38 through the free passage hole 41 of this adhesion pad 42, and this ink passage member 43.

[0035] The ink tank 44 is divided into three ink reservoir rooms 45a, 45b, and 45c in the interior. the case of the black print head unit 21 -- the ink reservoir rooms 45a, 45b, and 45c -- it is alike, respectively and black ink is stored. As for the case of the color print head unit 22, the ink of yellow, a Magenta, and cyanogen is stored by the ink reservoir rooms 45a, 45b, and 45c, respectively.

[0036] Drawing 3 (a) It is drawing showing the ink regurgitation side of the above-mentioned element chip 38, and this drawing (b) is drawing showing the rear face. This drawing (a) The element chip 38 equips the ink regurgitation side 46 with the nozzle train 47 of three trains so that it may be shown. 300 regurgitation nozzles 48 are formed in the nozzle train 47 for every train. As for 20 micrometers and an arrangement pitch, in these regurgitation nozzles 48, the diameter serves as a consistency of 600 per 25.4mm.

[0037] From the nozzle train 47 of three trains, in the case of the element chip 38 of the black print head unit 21, black ink is breathed out for all three trains, and if it is the case where it is the element chip 38 of the color print head unit 22, the ink of yellow, a Magenta, and cyanogen will be breathed out, respectively.

[0038] And in the rear face of the element chip 38, it is this drawing (b). A total of three ink feed holes 39 prepared one piece every above-mentioned nozzle train 47 is arranged so that it may be shown. This element chip 38 will be drawing 11 (a), if it sets aside that the above-mentioned nozzle trains 47 are three trains and that the number of the ink feed holes 39 on the back is three. - (d) It has the same internal structure as the shown print head 1.

[0039] Drawing 3 (a) The element chip 38 fits into the positioning fixed plate 37 shown in drawing 2, and the connection terminal 49 of the both ends of the shown element chip 38 is connected to the FPC36 wiring connection pad section, when it is arranged so that the ink regurgitation side 46 may be exposed to an external lower part from opening of FPC36.

[0040] Drawing 4 (a), (b), and (c) It is drawing showing typically the operating state of the line printer 20 of this example. in addition, this drawing (a), (b), and (c) **** -- the same number as drawing 1 is given, only a component required for explanation is shown in the same component as drawing 1, and other components are omitting illustration.

[0041] First, ^{the form} the form 34 shown in drawing 1 is drawing 4 (a). As an arrow head (F) shows, after being inserted from the method bottom of the right of drawing of the body of a printer, adsorbing the conveyance belt 35, being conveyed by the left of drawing and making a U-turn with the follower roller 33, it is discharged in the direction which it is printed, passing through a platen 31 top, and is shown by the arrow head G.

[0042] In the case of monochrome printing (only henceforth monochrome printing) only in black ink, it is drawing 4 (a). The color print head unit 22 can put the cap member 26 for color print heads in a maintenance location, and stops it, and opposite arrangement only of the black print head unit 21 is carried out at a platen 31 so that it may be shown. And with the control signal from a non-illustrated control unit, black ink is breathed out and the printing image of black Isshiki is formed on a form 34 (refer to drawing 1). In the meantime, since the cap member 26 for color print heads can be put and it is sealed from the open air, the color print head unit 22 does not perform priming actuation.

[0043] Thus, since capping of the regurgitation nozzle of the non-used color print head unit 22 is carried out even if the black print head unit 21 is printing, the yellow which is a non-used color in the meantime, a Magenta, and the amount of ink which the priming of the ink of cyanogen is not performed and is consumed by the priming by this can be reduced.

[0044] Moreover, it is drawing 4 (b) in the case of color printing. It is held at the head unit holders 23 and 24 shown in drawing 1, respectively, and opposite arrangement is carried out at a platen 31, and with the control signal from a control unit, the black print head unit 21 and the color print head unit 22 breathe out the ink of yellow, cyanogen, a Magenta, and black, and form a full color image on a form so that it may be shown.

[0045] And at the time of un-printing [of a line printer 20], the black print head unit 21 and the color print head unit 22 move to a maintenance location at one, the cap member 25 for black print heads is put on the black print head unit 21, and the cap member 26 for color print heads can be put on the color print head unit 22.

[0046] in addition, in monochrome printing by the above-mentioned black print head unit 21 Drawing 3 (a) As shown, the element chip 38 of the black print head unit 21 If printing control is carried out so that the ink droplet each regurgitation nozzle of each nozzle train of three trains carries out [an ink droplet] the regurgitation may form a

printing dot separately since it has the nozzle train 47 of three trains, as compared with the print speed performed in the nozzle train of one conventional train, it can print at a high speed by the 3 times as many print speed as this.

[0047] Moreover, although a print speed falls to the same rate as the case where it prints in the nozzle train of one conventional train when printing control is carried out so that the impact location of the ink droplet in which each nozzle train of three trains carries out the regurgitation may lap. When only the part with which the impact location of ink laps can control the concentration of ink, and the diameter of a printing dot to three kinds and outputs the high printing image of gradation nature etc. by this, the high-definition monochrome image of the Takashina tone faithful to a subject copy can be printed.

[0048] Moreover, since the black print head unit 21 and the color print head unit 22 are considered as the same configuration as mentioned above, the need of building and dividing can be lost, consequently productivity can improve, and a manufacturing cost can be reduced. Drawing 5 R> 5 (a) - (d) It is drawing showing the modification of the above-mentioned line printer 20. In addition, this drawing 5 (a) - (d). The same number as drawing 1 is given, only a component required for explanation is shown in the same device part as drawing 1, and other components are omitting illustration. This drawing 5 (a) - (d) At the shown example, a form is this drawing (a) first. It is discharged under [which it is inserted upward from the body left bottom of a printer as an arrow head J shows, the follower roller 33 reverses 90 degrees by the way, passes through a printing location, and a driving roller 32 reverses further 90 degrees by the way, and is shown by the arrow head K of drawing] the method of the right of a printer body.

[0049] A maintenance location is in two right and left, the cap member 26 for color print heads is arranged in a left maintenance location, and the cap member 25 for black print heads is arranged in the maintenance location of the method of the right. And in the case of drawing 1, the head unit holder 24 for colors is passively arranged to the head unit holder 23 for black, and they are drawing 4 (a) and (b). As shown, printing only by the color print head unit 22 did not have a line crack, but especially in this modification, although not illustrated, the head unit holder 23 for black and the head unit holder 24 for colors are engaging with the sliding mechanism 29 independently, respectively.

[0050] Therefore, drawing 5 (a) Color printing according only to the color print head unit 22 so that it may be shown, and this drawing (b). Monochrome printing according only to the black print head unit 21 so that it may be shown, and this drawing (c) Three kinds of printing approaches of color printing performed using both the black print head unit 21 and the color print head unit 22 so that it may be shown are alternatively employable.

[0051] And like the operation gestalt mentioned above, since capping of the regurgitation nozzle of the head unit (it is [in the case of drawing 5 (a)] the color print head unit 22 in the case of the black print head unit 21 and this drawing (b)) which is not used under printing is carried out, the priming of the ink of a non-used color is not performed and the amount of regurgitation ink by the priming can be reduced also in this case by this.

[0052] Although the configurations of the element chip 38 of the black print head unit 21 and the color print head unit 22 also including a modification are made the same with the above-mentioned operation gestalt, in the line printer of this invention, it is possible to perform monochrome printing of high resolution only by changing the configuration of the element chip 38 of the black print head unit 21, i.e., arrangement of a nozzle train, a little.

[0053] Drawing 6 is drawing showing the modification of the element chip 38 of such a black print head unit 21. As shown in this drawing, as for each of nozzle trains 47-1 of three trains formed in element chip 38', 47-2, and 47-3, the regurgitation nozzle 48 is arranged by array-pitch P.

[0054] And in this modification, mutual arrangement of the nozzle train 47 (47-1, 47-2, 47-3) of these 3 train is shifted every [$3 / P \cdot 1/3$] rather than arrangement of the adjoining nozzle train, and it arranges. namely, the nozzle train 47-3 in which the whole has shifted to the method of the right of drawing by $P \cdot 1/3$ pitch, and, as for the nozzle train 47-2 which adjoins upwards to the nozzle train 47-1, adjoins upwards to the nozzle train 47-2 -- further -- it has shifted to the method of the right of drawing by $P \cdot 1/3$ pitch.

[0055] If printing control is carried out using this element chip 38' so that the printing dot by the nozzle train 47 of three trains may come on the same Rhine, for example each nozzle train 47 shall be located in a line by the array pitch of 600 dots per 25.4mm, respectively, the resolution printed becomes 1800 dots per 25.4mm, and can be printed with the high resolution of 3 times of the array of the regurgitation dot 48.

[0056] Drawing 7 is the sectional side elevation showing typically the configuration of the line printer as a gestalt of the 2nd operation. As shown in this drawing, as for the line printer 50 of this example, the color print head unit 51 and the black print head unit 52 are arranged at the central housing. The color print head unit 51 is a print head unit of a configuration [long picture / the cross direction (drawing space perpendicular direction) of a form], it is used at the

time of color printing, and location immobilization is carried out by thrust with a spring 53. It is the print head unit of a configuration [long picture / the cross direction of a form], and the black print head unit 52 is also used at the time of color printing and monochrome printing, and is fixed to the non-illustrated body frame.

[0057] Yellow (Y), the Magenta (M) and the ink tank 54 (54-1, 54-2, 54-3) for the colors of cyanogen (C), and the ink tank 54 (54-4) for black ink are arranged at the topmost part of the body 50 of a printer. The end of an ink supply tube 55 corresponding to each ink tank 54 which carries out desorption of these ink tanks 54 from the top face of the body 50 of a printer as shown in drawing, when it is constituted and the body 50 of a printer is equipped is connected automatically. The other end of the ink supply tube 55 is connected to the print head corresponding to the color of the ink held in the ink tank 54 which the end has connected.

[0058] The migration platen 56 (56-1, 56-2) of two sheets is arranged directly under the color print head unit 51, and the migration platen 56 (56-3) of one sheet is arranged directly under the black print head unit 52. And the form conveyance direction lower-stream-of-a-river (left of drawing) side of the migration platen 56-1, The platen stowage 57 (57-1, 57-2, 57-3) which uses a form guide also [side / between the migration platen 56-2 and the migration platen 56-3 and / of the migration platen 56-3 / form conveyance direction upstream (method of right of drawing)] is arranged. The form conveyance way is formed in these migration platen 56 and the platen stowage 57

[0059] the upstream of this form conveyance way -- a conveyance roller pair -- 58, the feed roller 59, and a paper tray 61 arrange -- having -- **** -- the downstream of a form conveyance way -- a delivery roller pair -- 62 is arranged and the delivery opening 63 and a paper output tray 64 are formed in that lower stream of a river. Moreover, the cap unit 65 for colors corresponding to the color print head unit 51 is arranged the migration platen 56-1 and directly under 56-2. The cap unit 65 for colors consists of a waste ink tube 68, by which the end was connected to the attachment component 67 holding the cap member 66 for colors, and this cap member 66 for colors, and the cap member 66 for colors, engages with a non-illustrated drive, and is arranged possible [rise and fall]. The above-mentioned cap member 66 for colors is constituted by the rubber material which is an elastic body and does not let a gas pass, and the attachment component 67 consists of the rigid bodies.

[0060] Moreover, the cap unit 69 for black corresponding to the black print head unit 52 is arranged directly under the migration platen 56-3. The cap unit 69 for black consists of a waste ink tube 73 by which the end was connected to the attachment component 72 holding the cap member 71 for black, and this cap member 71 for black, and the cap member 71 for black, and this also engages with a non-illustrated drive and it is arranged possible [rise and fall]. These components are the same as that of the case of the color print head unit 51.

[0061] The migration platen 56-1 right above and 56-2 are held in the platen stowage 57-1 and 57-2, and, as for the cap unit 65 for colors, a hole is opened on a form conveyance way. After a hoistway is wide opened by the cap unit 65 for colors of the lower part of the color print head unit 51, it goes up, and the cap member 66 for colors contacts the edge of the four way type of the ink regurgitation side of the color print head unit 51, and closes the ink regurgitation side from the outside.

[0062] After the migration platen 56-3 right above is held in the platen stowage 57-3 and the hoistway of the cap unit 69 for black of the lower part of the black print head unit 52 is opened wide similarly, it goes up, and the cap member 71 for black contacts the edge of the four way type of the ink regurgitation side of the black print head unit 52, and the cap unit 69 for black also closes the ink regurgitation side from the outside.

[0063] As for the waste ink tubes 68 and 73 by which the end is connected to the above-mentioned cap member 66 for colors, and the cap member 71 for black, respectively, the other end is connected to the waste ink processor section 74. Although especially the waste ink processor section 74 is not illustrated to the interior, it is equipped with the pump device and the waste ink absorption member.

[0064] Moreover, the wiper members 75 and 76 are arranged down the above-mentioned form conveyance way. The wiper members 75 and 76 are supported respectively possible [sliding of the slide shafts 77 and 78]. When the migration platen 56-1 and 56-2 are held in the platen stowage 57-1 and 57-2 for wiping and the lower part space of the color print head unit 51 is opened wide, the wiper member 75 slides on between the color print head unit 51 and the cap members 66 for colors to the space perpendicular direction of drawing, carries out wiping of the ink regurgitation side of the color print head unit 51, wipes away adhesion ink and cleans it.

[0065] Moreover, it slides on the black print head unit 52, the cap member 71 for black, and between to the space perpendicular direction of drawing, wiping of the ink regurgitation side of the black print head unit 52 is carried out, and the wiper member 76 also wipes away and cleans adhesion ink, when the migration platen 56-3 is held in the platen

stowage 57-3 for wiping and the lower part space of the black print head unit 52 is opened wide similarly.

[0066] Drawing 8 (a) It is the perspective view showing more the configuration of the above-mentioned cap unit 65 for colors in a detail, and is this drawing (b). This drawing (a) A M-M' cross-section view Fig. and this drawing (c) It is the N-N' cross-section view Fig. of this drawing (a). In addition, this cap unit 65 for colors is constituted so that rise-and-fall migration may be carried out by the drive system which consists of devices in which illustration was omitted also here, such as a rack and a pinion.

[0067] This drawing (a), (b), and (c) The cap member 66 for colors of the cap unit 65 for colors has accomplished the funnel mold with which a base inclines downward toward a center, and the waste ink recovery hole 79 is formed in the center section so that it may be shown. The waste ink recovery hole 79 is open for free passage through the waste ink flow way 81 established in the upper part of an attachment component 67 in the waste ink tube 68 connected to the edge of this waste ink flow way 81.

[0068] As mentioned above, when this cap unit 65 for colors goes up, the cap member 66 for colors closes the ink regurgitation side of the color print head unit 51 from the outside and the color print head unit 51 performs a priming, the color ink by which the priming was carried out into the cap member 66 for colors is collected by the waste ink processor section 74 shown in drawing 7 through the waste ink recovery hole 79, the waste ink flow way 81, and the waste ink tube 68. Moreover, form ***** 82 is formed in the attachment component 67 of this cap unit 65 for colors.

2 About the function of this form ***** 82, it mentions later.

[0069] Since the cap unit 69 for black is also the almost same configuration as the above-mentioned cap unit 65 for colors, especially a point that is a little different although illustrate detail drawing and it is not explained is that form ***** 82 like the cap unit 65 for colors is not formed in the attachment component 72 of the cap unit 69 for black. Of course, although you may make it form form ***** also in the KYAPU unit 69 for black, it mentions later in detail also about this.

[0070] Drawing 9 (a), (b), and (c) It is drawing showing the operating state of the line printer 50 of a configuration of having mentioned above. In addition, the same number as drawing 7 and drawing 8 is given to the same component as the configuration which taken out and shows only the principal part required for explanation of operation in this drawing, and was shown in drawing 7 and drawing 8, and it is shown.

[0071] First, drawing 9 (a) It is full color and the operating state under printing is shown. Both the cap unit 65 for colors and the cap unit 69 for black are descending in the downward evacuation location, and all the migration platens 56 (56-1, 56-2, 56-3) have closed them, and they form the form conveyance way with the platen stowage 57 (57-1, 57-2, 57-3). There is a black print head unit 52 which is in a fixed position above the form conveyance way, and it ranks with this further, and the color print head unit 51 which descended in the printing location approaches a form conveyance way, and is arranged.

[0072] A form (un-illustrating) is conveyed in this form conveyance on the street, color ink and black ink are breathed out towards that space from the color print head unit 51 and the black print head unit 52, and the full color image containing black is formed in a form side. Next, drawing 9 (b) The operating state under monochrome printing only by the black print head unit 52 is shown. Only the cap unit 69 for black is descending in the downward evacuation location, the black print head unit 52 is in a printing posture, and the color print head unit 51 is going up in the capping location. And capping is carried out by the cap unit 65 for colors which went up in the capping location from the lower part, and it has become hibernation.

[0073] In addition, in advance of this, the migration platen 56-1 of color print head unit 51 directly under and 56-2 are held in the platen stowage 57-1 and 57-2, a hole is opened on a form conveyance way, and the rise way of the cap unit 65 for colors is opened wide. And form ***** 82 which mentioned above the inside of the hole of a form conveyance way in the attachment component 67 of the cap unit 65 for colors which went up is formed, and as shown in drawing, when the cap unit 65 for colors goes up in a capping location, this form ***** 82 complements the hole of that above-mentioned form conveyance way, and forms the form guide section there.

[0074] By this, from a conveyance style side on the street, a form passes through the platen stowage 57-3, the migration platen 56-3, and the platen stowage 57-2, and goes into form ***** 82. It is conveyed in the same conveyance path as usual [which change does not produce in the direction of a path] of coming out from there on the platen stowage 57-1, black ink is breathed out from the black print head unit 52 towards the space, and a monochrome image is formed in a form side.

[0075] And since capping of the color print head unit 51 is carried out by the cap unit 65 for colors in the meantime,

there is no need for a priming and consumption of the color ink by the priming is controlled. Drawing 9 R> 9 (c) The condition when this line printer 50 has stopped printing is shown. The color print head unit 51 is this drawing (b). Capping is carried out by the cap unit 65 for colors which went up in the capping location like the time of shown monochrome image printing, and it is set as hibernation. And capping also of the black print head unit 52 in a fixed position is carried out by the cap unit 69 for black which went up from the bottom, and it is set as hibernation. The migration platen 56-3 is held in the platen stowage 57-3, and the rise way of the cap unit 69 for black is opened wide. [0076] Drawing 10 is drawing showing the configuration and operating state of a modification of the above-mentioned line printer 50. It differs from the case of drawing 9 that the black print head unit 52 goes up and down in a printing location and a capping location like the color print head unit 51 and that cap unit 69' for black is equipped with the same form ***** 83 as the cap unit 65 for colors with the configuration of the principal part shown in this drawing. [0077] Drawing 10 (a) It is full color and the operating state under printing is shown. Both the cap unit 65 for colors and cap unit 69' for black were descending in the downward evacuation location, descended in the printing location where both the color print head unit 51 and the black print head unit 52 approach a form conveyance way from an upper capping location, and have taken the full color printing posture. In addition, printing actuation is drawing 9 (a). It is the same as that of a case. [0078] Drawing 10 (b) Monochrome shows the operating state under printing. Only cap unit 69' for black is descending in the downward evacuation location, the black print head unit 52 is in a printing posture, the color print head unit 51 goes up in a capping location, and capping is carried out by the cap unit 65 for colors, and it has become hibernation. Actuation of other each part before this and next printing actuation are drawing 9 (b). It is the same as that of a case. [0079] Next, drawing 10 (c) The condition of printing actuation peculiar to this modification is shown. The condition of this printing actuation shows the condition of performing color printing only in the yellow (Y) by the color print head unit 51 which does not mix black ink, a Magenta (M), and the color ink of three colors of cyanogen (C). [0080] That is, it goes up in a capping location and the rise way of KYAPU unit 69' for black of a form conveyance way [directly under] is opened wide, and the black print head unit 52 complements the hole of the form conveyance way where the form ***** 83 was wide opened as the above-mentioned rise way, and forms the form guide while cap unit 69' for black goes up to a capping location and carries out capping of the black print head unit 52. [0081] Thereby, a form is conveyed from a conveyance style side on the street via the platen stowage 57-3, form ***** 83, the platen stowage 57-2, the migration platen 56-2, 56-1, and the platen stowage 57-1. Thereby, a form is conveyed also in this case in the same conveyance path as usual [which change does not produce in the direction of a path], and the color picture which does not mix black with that space is formed. [0082] And since capping of the black print head unit 52 is carried out by cap unit 69' for black in the meantime, there is no need for a priming and consumption of the black ink by the priming is controlled. In addition, drawing 10 (d) The condition when this line printer has stopped printing is shown. [0083] The sense of the ink regurgitation side which is made to rotate a print head unit and serves as facing down at the time of printing may be changed, and although considered as the configuration which is made to move a print head unit or a capping unit in a longitudinal direction or the vertical direction, and performs capping actuation, you may constitute from a gestalt of the above 1st and the 2nd implementation so that capping actuation by the capping unit may be performed in the location. [0084] Moreover, although considered as the configuration which processes by using as waste ink the ink by which the priming was carried out into the cap member with the gestalt of the 2nd operation, it is good also as a configuration collected and reused. [0085] [Effect of the Invention] As explained to the detail above, since capping of the regurgitation nozzle of the head unit of a non-used color is carried out even if it is [printing] under operation, according to this invention, the ink consumption by the priming of the ink of a non-used color can be reduced sharply. [0086] Moreover, by making the nozzle train of a black print head unit into three trains of the same configuration as a color print head unit like the gestalt of operation of the 1st of this invention As compared with the print speed performed in the nozzle train of one conventional train, it can print at a high speed by the 3 times as many print speed as this, and if the impact location of ink is overlapped and the concentration of ink is controlled to three kinds, the monochrome image of the Takashina tone can be printed. [0087] Moreover, since the black print head unit and the color print head unit are considered as the same configuration,

productivity can reduce a manufacturing cost well. Furthermore, like the gestalt of operation of the 2nd of this invention, by preparing ***** of a form in a capping member, KYAPINGU actuation of the head unit of the non-used color ink under printing operation can be performed, evacuation actuation of capping becomes easier by this only at vertical movement of a head unit and a capping member, and it becomes possible to offer a line printer advantageous to a miniaturization.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] Even if other regurgitation nozzles are printing this invention, it relates to the color ink jet printer which capping of the regurgitation nozzle of a non-used color was carried out [ink jet printer], and reduced the amount of regurgitation ink of a priming.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Conventionally, the ink jet printer is used. The printing approach in this ink jet printer makes the drop of ink breathe out from the regurgitation nozzle of a print head, makes recorded materials, such as paper and cloth, absorb this ink droplet, and prints an alphabetic character, an image, etc. (printing). This printing method has little generating of the noise, without requiring special fixing processing, moreover high-speed printing can be performed and full color printing is also the possible printing approach.

[0003] In full color printing, it usually prints using the ink of four colors which added the black (black) used for an alphabetic character, the black part of an image, etc. in the ink of three colors of the yellow (yellow) which is subtractive primary colors, a Magenta (red color name), and cyanogen (blue with greenishness). That is, arranging the nozzle train only for [each] colors in one print head, and controlling the discharge quantity of each color for the ink of four colors of yellow, a Magenta, cyanogen, and black from these nozzle trains, 1 pixel of discharge, for example, a recorded material, is made to carry out mixed absorption of each ink, and full color printing is performed to it.

[0004] In the print head of an ink jet printer which makes an ink droplet breathe out from the above-mentioned regurgitation nozzle The ink pressurized room formed minutely is made to produce the pressure by the mechanical deformation using electric machine sensing elements, such as a piezo-electric element. The print head of a piezo type ink jet printer which makes an ink droplet breathe out from a minute regurgitation nozzle with this supersensitive pressure, A resistance heater element is allotted to a detailed ink pressurized room, an electric pulse is given to this, heating foaming of the ink is carried out at high speed, and there is a print head of the thermal type ink jet printer made to breathe out using the growth force of the air bubbles.

[0005] Drawing 11 (a) It is the top view showing the ink regurgitation side of the print head of the roof shooter mold in such a thermal type, and is this drawing (b). It is the rear view. Moreover, this drawing (c) This drawing (a) It is the enlarged drawing in which seeing through the top plate of the part squarely surrounded with the broken line a, and showing the interior, and is this drawing (d). This drawing (c) It is an A-A' cross-section view Fig.

[0006] This drawing (a) The shown print head 1 is 4 train preparation ***** about the nozzle train 2 on one chip substrate. The nozzle train 2 of these 4 train is equipped with many regurgitation nozzles 3, respectively, and it consists of these regurgitation nozzles 3 so that the regurgitation of the ink droplet of yellow ink (Y), Magenta ink (M), cyanogen ink (C), or black ink (K) may be carried out every nozzle train 2.

[0007] This drawing (a) - (d) The drive circuit 5 is formed in the top face of the chip substrate 4 by the LSI formation processing technique, it is punctured by sandblasting and, as for the print head 1, the ink feed holes 7 penetrated at the rear face of the chip substrate 4 from the base of this ink supply slot 6 are formed for the ink supply slot 6 so that it may be shown.

[0008] Between the above-mentioned drive circuit 5 and the ink supply slot 6, the heater element by the common electrode 9 and the individual wiring electrode 11 which were connected to the exoergic section 8 of an exoergic resistor and the both ends of this exoergic section 8 is formed by thin film coating technology, such as sputtering, mask pattern formation techniques, such as photolithography, and patternizing techniques, such as etching. Although this heater element is based also on the plan on a design, a large number formation of 64 pieces, 128 pieces, the 256 etc. pieces, etc. is carried out. Furthermore, the circuit electrode terminal 5-1 of the drive circuit 5 is connected to these individual wiring electrodes 11, and the electrode terminal 12 for connection with the exterior is formed in the edge of the upper and lower sides of chip substrate 4 top face.

[0009] And on these, the laminating of the septum 13 (13-1, 13-2, 13-3) is carried out all over removing the electrode

terminal 12 above-mentioned part for connection. A septum 13 forms the batch septum 13-3 which begins to be further extended between each exoergic section 8 and the exoergic section 8 from the seal septum 13-2 of this individual wiring electrode 11 part while it forms the seal septum 13-1 which intercepts ink from the outside to the left of the ink supply slot 6 by one side and forms the seal septum 13-2 which intercepts ink from the outside on the individual wiring electrode 11 and the drive circuit 5 on the other hand.

[0010] 13 to batch septum 3 part which begins to be extended between each exoergic section 8 the drum of a comb, then after this in 13 to seal septum 2 part on the individual wiring electrode 11 of the above-mentioned septum 13 and the drive circuit 5 is making the configuration equivalent to the gear tooth of a comb. The ink pressurized room 14 of the typeface (refer to this drawing (c)) of KO where the cross section where the exoergic section 8 has been arranged is detailed is formed in the root part between the gear teeth of this comb only for the number of the exoergic sections 8. And the ink passage 15 is formed between these ink pressurized room 14 and the ink supply slot 6.

[0011] Furthermore, the laminating of the top plate 16 is carried out after these configurations, many regurgitation nozzles 3 mentioned above are drilled in the location which counters at the above-mentioned exoergic section 8 of the top plate 16, and it is drawing 6 (a). The nozzle train 2 of four shown trains is formed. A print head 1 is completed, respectively on the chip substrate 4 of a large number currently formed on the non-illustrated silicon wafer in such a configuration. And a dicing saw etc. is used, finally a silicon wafer, and it separates according to an individual every chip substrate 4, and die bonding is carried out to a mounting substrate, terminal strapping is carried out to it, and the print head module of a practical unit is completed.

[0012] The ink in which this print head 1 is supplied to the external ink feed holes 7 from an ink cartridge etc. is supplied to the ink pressurized room 14 through the ink supply slot 6 and the ink passage 15. On the occasion of printing, the exoergic section 8 energizes alternatively according to printing information, generate heat in an instant, the interface of the exoergic section 8 and ink is made to generate a film-boiling phenomenon, and an ink droplet is breathed out by the growth pressure of the film air bubbles from the regurgitation nozzle 3 corresponding to the exoergic section 8. An ink droplet serves as a printing dot of the magnitude of a twice as many diameter as ****, and reaches the target on non-illustrated space. An image is formed in a form side of this.

[0013] By the way, in the manufacturing technology of the above-mentioned print head, since various limitations were in a processing technique (mainly processing equipment), the above-mentioned print head 1 was conventionally used for the serial type printer chiefly difficultly [making the print head of the long long picture of a nozzle train] therefore.

[0014] the head unit in which the print head 1 was mounted equips carriage with a serial type printer with an ink cartridge -- having -- a printing main scanning direction (drawing 11 (a) --) (b) It is what carries out both-way migration at a longitudinal direction, and prints by breathing out ink from the regurgitation nozzle 3 to the form by which intermittent conveyance is carried out in the both-way migration direction of this carriage, and the direction which intersects perpendicularly (printing). Since it is [that it can miniaturize cheap comparatively and] convenient, the price is widely used as a personal printer.

[0015] However, it has the problem that it is convenient small in this way and that it cannot print at a high speed since a serial type printer has the narrow width of face which can be printed at once. Moreover, though a print head with a long nozzle train is moved temporarily, since the load at the time of a print head moving becomes large and troublesome various problems, such as degradation of the quality of printed character by vibration, strengthening of a frame, and enlargement of equipment, occur, it is not practical.

[0016] Generally, a printer is divided roughly and has a Rhine style printer other than the above-mentioned serial type printer. A Rhine style printer is a method which fixes the print head to the body side of a printer, and conveys only a form using the print head which arranged and long-picture-ized the printing component to the limit of the printing area of a main scanning direction, and since mechanical movement is only conveyance of a form, the load of a drive system is small, and there is little power consumption, and it is economical.

[0017] Moreover, a Rhine style printer is a printer corresponding to rapidity in the method itself. Therefore, in order to meet the request of wanting to make the rate of printing processing into a high speed more, like recent years, the direction of a Rhine style printer takes the lead in future development from a serial-type printer.

[0018] Drawing 12 is drawing showing typically the configuration of the color print head of such a Rhine style printer. As shown in this drawing, the color print head 17 extends in the printing main scanning direction shown by the arrow head B of drawing, and much element chips 18 (the same thing as the print head 1 of drawing 11) are arranged in the

shape of an alternate pattern alternately on the parent substrate 19 (staggered arrangement), and it forms the printing area of die-length C in a main scanning direction.

[0019] By the way, it sets to the print head of the above ink jet methods. Since the use pause of the body of a printer may be carried out or the long time amount ink regurgitation may not be performed depending on a regurgitation nozzle while in use The moisture of the ink in the regurgitation nozzle which was not used for printing evaporates, the viscosity of ink rises, and there is a possibility that there may be some which start blinding in many regurgitation nozzles and have become the poor regurgitation.

[0020] Therefore, in order to cancel this blinding that may have been generated that is, wiping which is eradication processing of the ink regurgitation side by the wiping member, and the priming which is air ejecting processing (regurgitation of ink without printing) of the ink by all regurgitation nozzles are periodically performed for regurgitation functional recovery.

[0021] Moreover, at the time of un-using [of a print head] it, as much as possible, desiccation prevention devices, such as capping of a print head, are established so that the above blinding by desiccation of an ink regurgitation nozzle may not occur.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained to the detail above, since capping of the regurgitation nozzle of the head unit of a non-used color is carried out even if it is [printing] under operation, according to this invention, the ink consumption by the priming of the ink of a non-used color can be reduced sharply.

[0086] Moreover, by making the nozzle train of a black print head unit into three trains of the same configuration as a color print head unit like the gestalt of operation of the 1st of this invention As compared with the print speed performed in the nozzle train of one conventional train, it can print at a high speed by the 3 times as many print speed as this, and if the impact location of ink is overlapped and the concentration of ink is controlled to three kinds, the monochrome image of the Takashina tone can be printed.

[0087] Moreover, since the black print head unit and the color print head unit are considered as the same configuration, productivity can reduce a manufacturing cost well. Furthermore, like the gestalt of operation of the 2nd of this invention, by preparing ***** of a form in a capping member, KYAPINGU actuation of the head unit of the non-used color ink under printing operation can be performed, evacuation actuation of capping becomes easier by this only at vertical movement of a head unit and a capping member, and it becomes possible to offer a line printer advantageous to a miniaturization.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, generally, a printer may not say that sole possession is taken by color printing just because it is a color printer, and it may be used for black printing like addressing name writing of creation of a document, or mail. When using a printer especially for a business application, the ratio in the case of outputting by black printing becomes high. It is drawing 11 (a) at the time of such black printing. The nozzle train of the shown black ink (K) of a print head 1 was used, and the nozzle train of color ink, such as cyanogen ink for color printing (C), Magenta ink (M), and yellow ink (Y), is stopped.

[0023] However, although it has stopped, since it is exposed during the open air with the nozzle train of black ink, the nozzle train of the color ink for these color printings needs to perform a priming, in order to prevent desiccation like the nozzle train of black ink. That is, un-arranging [of being consumed without presenting printing whenever color ink is a priming] occurs. Un-arranging [of the same being said of the case of color printing performed only in the ink of three colors of yellow, a Magenta, and cyanogen not using black ink, and being consumed, without presenting printing whenever black ink is a priming in that case] generates this.

[0024] In the case of a Rhine style printer as shown especially in drawing 12 , since there are many regurgitation nozzles per color, the discharge quantity by the priming of the ink of the color which is not used increases, and a serious problem is posed. The technical problem of this invention is being able to reduce sharply the amount of ink consumed by the recovery regurgitation in view of the above-mentioned conventional actual condition, and offering an advantageous color ink jet printer in respect of a running cost.

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MEANS

[Means for Solving the Problem] The black print head to which the color ink jet printer of this invention carries out the regurgitation of the black ink, The cap member for black print heads put on the ink regurgitation side of this black print head free [attachment and detachment], The color print head which carries out the regurgitation of yellow, a Magenta, and each color ink of cyanogen at least, It has the cap member for color print heads put on the ink regurgitation side of this color print head free [attachment and detachment]. The above-mentioned black print head or the above-mentioned color print head It prints, where discharging of the above-mentioned cap member corresponding to self is carried out at the time of each printing activation, and at the time of each printing un-performing, it is constituted so that the cap member above-mentioned [corresponding to / it is not scrupulous nothing and / self] with which another side is printing performing may be put.

[0026] The above-mentioned black print head and the above-mentioned color print head are print heads for Rhine style printing equipped with the regurgitation nozzle train according to claim 2 corresponding to [like] both the printing area width-of-face whole region, for example. And it is fixed to the maintenance location according to claim 3 whose cap member for the above-mentioned black print heads and cap member for the above-mentioned color print heads perform maintenance processing like, respectively, for example, and the above-mentioned black print head and the above-mentioned color print head are arranged free in migration between the printing location which prints by countering a form, respectively, and the above-mentioned maintenance location where the above-mentioned cap member corresponding to self is put.

[0027] Moreover, it is arranged in an evacuation location free [migration], for example at the time of the maintenance location according to claim 4 whose cap member for the above-mentioned black print heads and cap member for the above-mentioned color print heads perform maintenance processing like, and printing, and the above-mentioned black print head and the above-mentioned color print head may be made it being arranged between the printing location which prints by countering a form, respectively, and the above-mentioned maintenance location free in migration.

[0028] Moreover, it is fixed to the printing location according to claim 5 which prints by the above-mentioned black print head countering a form like, for example. The above-mentioned color print head is arranged free [migration] between a printing location and the maintenance location which performs maintenance processing. The cap member for the above-mentioned black print heads is arranged in the head discharging evacuation location at the time of printing, and the covering location to the above-mentioned black print head to which it was fixed at the time of un-printing free [migration]. The cap member for the above-mentioned color print heads may be made to be arranged free [migration] in the head discharging evacuation location at the time of printing, and the covering location to the above-mentioned color print head in the maintenance location at the time of un-printing].

[0029] In addition, as for the above-mentioned maintenance processing, it is desirable to make it include the processing which performs either or all of capping according to claim 6 as processing for maintaining proper discharging performance like, wiping, and a priming, for example.

[0030]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to a drawing. Drawing 1 is the perspective view showing typically the configuration of a Rhine style ink jet printer (only henceforth a line printer) as a gestalt of the 1st operation. As shown in this drawing, this line printer 20 is equipped with the head unit holder 23 for black holding the black print head unit 21, the color print head unit 22, and the black print head unit 21, the head unit holder 24 for colors holding the color print head unit 22, the cap member 25 for black print heads

arranged in the maintenance location, and the cap member 26 for color print heads similarly arranged in the maintenance location.

[0031] Moreover, the line printer 20 is equipped with the sliding mechanism 29 which consists of the guide shaft 27 which slides two more head unit holders 24 [23 and] 21, i.e., a black print head unit, and the color print head unit 22 on above maintenance location and printing location as the both-directions arrow head E of drawing shows, and a driving belt 28.

[0032] In addition, although the head unit holder 23 for black is engaging with the sliding mechanism 29, the head unit holder 24 for colors does not engage with a sliding mechanism 29, but is engaging with the head unit holder 23 for black. That is, the head unit holder 23 for black is actively arranged to the head unit holder 24 for colors, and the color print head unit 22 is passively arranged to the head unit holder 23 for black.

[0033] And the platen 31 which countered the black print head unit 21 and the color print head unit 22 which are held in the printing location which shows a line printer 20 in this drawing further at two head unit holders 23 and 24, and has been arranged, the driving roller 32 arranged at the both sides of this platen 31 and the follower roller 33, and the list were built between these driving rollers 32 and follower 33, and it has the form conveyance belt 35 which adsorbs a form 34 electrostatic and conveys it.

[0034] Drawing 2 is the decomposition perspective view of the above-mentioned black print head unit 21. In addition, the color print head unit 22 is also the same configuration. As shown in this drawing, the black print head unit 21 (or color print head unit 22) FPC36 which it has [FPC] opening arranged in the shape of a reel, and had much wiring connection pad sections arranged to the both ends of this opening (flexible substrate), The plate 37 for the -cum-positioning immobilization for FPC reinforcement which has the notching section arranged in the shape of a reel as well as the location corresponding to opening of this FPC36, The element chip 38 of two or more (the example of drawing 17 pieces) by which inserts in the above-mentioned notching section of this plate 37, turns an ink regurgitation side downward, and positioning immobilization is carried out at a precision, The adhesion pad 42 which equipped with the free passage hole 41 the location corresponding to the ink feed holes 39 which carry out opening to the tooth back of these element chips 38, It changes from the ink tank 44 which supplies ink to the ink passage member 43 equipped with two or more ink passage (this example 3) which supplies ink to the ink feed holes 39 of the element chip 38 through the free passage hole 41 of this adhesion pad 42, and this ink passage member 43.

[0035] The ink tank 44 is divided into three ink reservoir rooms 45a, 45b, and 45c in the interior. the case of the black print head unit 21 -- the ink reservoir rooms 45a, 45b, and 45c -- it is alike, respectively and black ink is stored. As for the case of the color print head unit 22, the ink of yellow, a Magenta, and cyanogen is stored by the ink reservoir rooms 45a, 45b, and 45c, respectively.

[0036] Drawing 3 (a) It is drawing showing the ink regurgitation side of the above-mentioned element chip 38, and this drawing (b) is drawing showing the rear face. This drawing (a) The element chip 38 equips the ink regurgitation side 46 with the nozzle train 47 of three trains so that it may be shown. 300 regurgitation nozzles 48 are formed in the nozzle train 47 for every train. As for 20 micrometers and an arrangement pitch, in these regurgitation nozzles 48, the diameter serves as a consistency of 600 per 25.4mm.

[0037] From the nozzle train 47 of three trains, in the case of the element chip 38 of the black print head unit 21, black ink is breathed out for all three trains, and if it is the case where it is the element chip 38 of the color print head unit 22, the ink of yellow, a Magenta, and cyanogen will be breathed out, respectively.

[0038] And in the rear face of the element chip 38, it is this drawing (b). A total of three ink feed holes 39 prepared one piece every above-mentioned nozzle train 47 is arranged so that it may be shown. This element chip 38 will be drawing 11 (a), if it sets aside that the above-mentioned nozzle trains 47 are three trains and that the number of the ink feed holes 39 on the back is three. - (d) It has the same internal structure as the shown print head 1.

[0039] Drawing 3 (a) The element chip 38 fits into the positioning fixed plate 37 shown in drawing 2, and the connection terminal 49 of the both ends of the shown element chip 38 is connected to the FPC36 wiring connection pad section, when it is arranged so that the ink regurgitation side 46 may be exposed to an external lower part from opening of FPC36.

[0040] Drawing 4 (a), (b), and (c) It is drawing showing typically the operating state of the line printer 20 of this example. in addition, this drawing (a), (b), and (c) **** -- the same number as drawing 1 is given, only a component required for explanation is shown in the same component as drawing 1, and other components are omitting illustration.

[0041] First, the form 34 shown in drawing 1 is drawing 4 (a). As an arrow head F shows, after being inserted from the method bottom of the right of drawing of the body of a printer, adsorbing the conveyance belt 35, being conveyed by the left of drawing and making a U-turn with the follower roller 33, it is discharged in the direction which it is printed, passing through a platen 31 top, and is shown by the arrow head G.

[0042] In the case of monochrome printing (only henceforth monochrome printing) only in black ink, it is drawing 4 (a). The color print head unit 22 can put the cap member 26 for color print heads in a maintenance location, and stops it, and opposite arrangement only of the black print head unit 21 is carried out at a platen 31 so that it may be shown. And with the control signal from a non-illustrated control unit, black ink is breathed out and the printing image of black Isshiki is formed on a form 34 (refer to drawing 1). In the meantime, since the cap member 26 for color print heads can be put and it is sealed from the open air, the color print head unit 22 does not perform priming actuation.

[0043] Thus, since capping of the regurgitation nozzle of the non-used color print head unit 22 is carried out even if the black print head unit 21 is printing, the yellow which is a non-used color in the meantime, a Magenta, and the amount of ink which the priming of the ink of cyanogen is not performed and is consumed by the priming by this can be reduced.

[0044] Moreover, it is drawing 4 (b) in the case of color printing. It is held at the head unit holders 23 and 24 shown in drawing 1, respectively, and opposite arrangement is carried out at a platen 31, and with the control signal from a control unit, the black print head unit 21 and the color print head unit 22 breathe out the ink of yellow, cyanogen, a Magenta, and black, and form a full color image on a form so that it may be shown.

[0045] And at the time of un-printing [of a line printer 20], the black print head unit 21 and the color print head unit 22 move to a maintenance location at one, the cap member 25 for black print heads is put on the black print head unit 21, and the cap member 26 for color print heads can be put on the color print head unit 22.

[0046] in addition, in monochrome printing by the above-mentioned black print head unit 21 Drawing 3 (a) As shown, the element chip 38 of the black print head unit 21 If printing control is carried out so that the ink droplet each regurgitation nozzle of each nozzle train of three trains carries out [an ink droplet] the regurgitation may form a printing dot separately since it has the nozzle train 47 of three trains, as compared with the print speed performed in the nozzle train of one conventional train, it can print at a high speed by the 3 times as many print speed as this.

[0047] Moreover, although a print speed falls to the same rate as the case where it prints in the nozzle train of one conventional train when printing control is carried out so that the impact location of the ink droplet in which each nozzle train of three trains carries out the regurgitation may lap When only the part with which the impact location of ink laps can control the concentration of ink, and the diameter of a printing dot to three kinds and outputs the high printing image of gradation nature etc. by this, the high-definition monochrome image of the Takashina tone faithful to a subject copy can be printed.

[0048] Moreover, since the black print head unit 21 and the color print head unit 22 are considered as the same configuration as mentioned above, the need of building and dividing can be lost, consequently productivity can improve, and a manufacturing cost can be reduced. Drawing 5 R> 5 (a) - (d) It is drawing showing the modification of the above-mentioned line printer 20. In addition, this drawing 5 (a) - (d) The same number as drawing 1 is given, only a component required for explanation is shown in the same device part as drawing 1, and other components are omitting illustration. This drawing 5 (a) - (d) At the shown example, a form is this drawing (a) first. It is discharged under [which it is inserted upward from the body left bottom of a printer as an arrow head J shows, the follower roller 33 reverses 90 degrees by the way, passes through a printing location, and a driving roller 32 reverses further 90 degrees by the way, and is shown by the arrow head K of drawing] the method of the right of a printer body.

[0049] A maintenance location is in two right and left, the cap member 26 for color print heads is arranged in a left maintenance location, and the cap member 25 for black print heads is arranged in the maintenance location of the method of the right. And in the case of drawing 1, the head unit holder 24 for colors is passively arranged to the head unit holder 23 for black, and they are drawing 4 (a) and (b). As shown, printing only by the color print head unit 22 did not have a line crack, but especially in this modification, although not illustrated, the head unit holder 23 for black and the head unit holder 24 for colors are engaging with the sliding mechanism 29 independently, respectively.

[0050] Therefore, drawing 5 (a) Color printing according only to the color print head unit 22 so that it may be shown, and this drawing (b) Monochrome printing according only to the black print head unit 21 so that it may be shown, and this drawing (c) Three kinds of printing approaches of color printing performed using both the black print head unit 21 and the color print head unit 22 so that it may be shown are alternatively employable.

[0051] And like the operation gestalt mentioned above, since capping of the regurgitation nozzle of the head unit (it is [in the case of drawing 5 (a)] the color print head unit 22 in the case of the black print head unit 21 and this drawing (b)) which is not used under printing is carried out, the priming of the ink of a non-used color is not performed and the amount of regurgitation ink by the priming can be reduced also in this case by this.

[0052] Although the configurations of the element chip 38 of the black print head unit 21 and the color print head unit 22 also including a modification are made the same with the above-mentioned operation gestalt, in the line printer of this invention, it is possible to perform monochrome printing of high resolution only by changing the configuration of the element chip 38 of the black print head unit 21, i.e., arrangement of a nozzle train, a little.

[0053] Drawing 6 is drawing showing the modification of the element chip 38 of such a black print head unit 21. As shown in this drawing, as for each of nozzle trains 47-1 of three trains formed in element chip 38', 47-2, and 47-3, the regurgitation nozzle 48 is arranged by array-pitch P.

[0054] And in this modification, mutual arrangement of the nozzle train 47 (47-1, 47-2, 47-3) of these 3 train is shifted every [$3 / P.1/3$] rather than arrangement of the adjoining nozzle train, and it arranges. namely, the nozzle train 47-3 in which the whole has shifted to the method of the right of drawing by $P.1/3$ pitch, and, as for the nozzle train 47-2 which adjoins upwards to the nozzle train 47-1, adjoins upwards to the nozzle train 47-2 -- further -- it has shifted to the method of the right of drawing by $P.1/3$ pitch.

[0055] If printing control is carried out using this element chip 38' so that the printing dot by the nozzle train 47 of three trains may come on the same Rhine, for example each nozzle train 47 shall be located in a line by the array pitch of 600 dots per 25.4mm, respectively, the resolution printed becomes 1800 dots per 25.4mm, and can be printed with the high resolution of 3 times of the array of the regurgitation dot 48.

[0056] Drawing 7 is the sectional side elevation showing typically the configuration of the line printer as a gestalt of the 2nd operation. As shown in this drawing, as for the line printer 50 of this example, the color print head unit 51 and the black print head unit 52 are arranged at the central housing. The color print head unit 51 is a print head unit of a configuration [long picture / the cross direction (drawing space perpendicular direction) of a form], it is used at the time of color printing, and location immobilization is carried out by thrust with a spring 53. It is the print head unit of a configuration [long picture / the cross direction of a form], and the black print head unit 52 is also used at the time of color printing and monochrome printing, and is fixed to the non-illustrated body frame.

[0057] Yellow (Y), the Magenta (M) and the ink tank 54 (54-1, 54-2, 54-3) for the colors of cyanogen (C), and the ink tank 54 (54-4) for black ink are arranged at the topmost part of the body 50 of a printer. The end of an ink supply tube 55 corresponding to each ink tank 54 which carries out desorption of these ink tanks 54 from the top face of the body 50 of a printer as shown in drawing, when it is constituted and the body 50 of a printer is equipped is connected automatically. The other end of the ink supply tube 55 is connected to the print head corresponding to the color of the ink held in the ink tank 54 which the end has connected.

[0058] The migration platen 56 (56-1, 56-2) of two sheets is arranged directly under the color print head unit 51, and the migration platen 56 (56-3) of one sheet is arranged directly under the black print head unit 52. And the form conveyance direction lower-stream-of-a-river (left of drawing) side of the migration platen 56-1, The platen stowage 57 (57-1, 57-2, 57-3) which uses a form guide also [side / between the migration platen 56-2 and the migration platen 56-3 and / of the migration platen 56-3 / form conveyance direction upstream (method of right of drawing)] is arranged. The form conveyance way is formed in these migration platen 56 and the platen stowage 57.

[0059] the upstream of this form conveyance way -- a conveyance roller pair -- 58, the feed roller 59, and a paper tray 61 arrange -- having -- **** -- the downstream of a form conveyance way -- a delivery roller pair -- 62 is arranged and the delivery opening 63 and a paper output tray 64 are formed in that lower stream of a river. Moreover, the cap unit 65 for colors corresponding to the color print head unit 51 is arranged the migration platen 56-1 and directly under 56-2. The cap unit 65 for colors consists of a waste ink tube 68 by which the end was connected to the attachment component 67 holding the cap member 66 for colors, and this cap member 66 for colors, and the cap member 66 for colors, engages with a non-illustrated drive, and is arranged possible [rise and fall]. The above-mentioned cap member 66 for colors is constituted by the rubber material which is an elastic body and does not let a gas pass, and the attachment component 67 consists of the rigid bodies.

[0060] Moreover, the cap unit 69 for black corresponding to the black print head unit 52 is arranged directly under the migration platen 56-3. The cap unit 69 for black consists of a waste ink tube 73 by which the end was connected to the attachment component 72 holding the cap member 71 for black, and this cap member 71 for black, and the cap member

71 for black, and this also engages with a non-illustrated drive and it is arranged possible [rise and fall]. These components are the same as that of the case of the color print head unit 51.

[0061] The migration platen 56-1 right above and 56-2 are held in the platen stowage 57-1 and 57-2, and, as for the cap unit 65 for colors, a hole is opened on a form conveyance way. After a hoistway is wide opened by the cap unit 65 for colors of the lower part of the color print head unit 51, it goes up, and the cap member 66 for colors contacts the edge of the four way type of the ink regurgitation side of the color print head unit 51, and closes the ink regurgitation side from the outside.

[0062] After the migration platen 56-3 right above is held in the platen stowage 57-3 and the hoistway of the cap unit 69 for black of the lower part of the black print head unit 52 is opened wide similarly, it goes up, and the cap member 71 for black contacts the edge of the four way type of the ink regurgitation side of the black print head unit 52, and the cap unit 69 for black also closes the ink regurgitation side from the outside.

[0063] As for the waste ink tubes 68 and 73 by which the end is connected to the above-mentioned cap member 66 for colors, and the cap member 71 for black, respectively, the other end is connected to the waste ink processor section 74. Although especially the waste ink processor section 74 is not illustrated to the interior, it is equipped with the pump device and the waste ink absorption member.

[0064] Moreover, the wiper members 75 and 76 are arranged down the above-mentioned form conveyance way. The wiper members 75 and 76 are supported respectively possible [sliding of the slide shafts 77 and 78]. When the migration platen 56-1 and 56-2 are held in the platen stowage 57-1 and 57-2 for wiping and the lower part space of the color print head unit 51 is opened wide, the wiper member 75 slides on between the color print head unit 51 and the cap members 66 for colors to the space perpendicular direction of drawing, carries out wiping of the ink regurgitation side of the color print head unit 51, wipes away adhesion ink and cleans it.

[0065] Moreover, it slides on the black print head unit 52, the cap member 71 for black, and between to the space perpendicular direction of drawing, wiping of the ink regurgitation side of the black print head unit 52 is carried out, and the wiper member 76 also wipes away and cleans adhesion ink, when the migration platen 56-3 is held in the platen stowage 57-3 for wiping and the lower part space of the black print head unit 52 is opened wide similarly.

[0066] Drawing 8 (a) It is the perspective view showing more the configuration of the above-mentioned cap unit 65 for colors in a detail, and is this drawing (b). This drawing (a) A M-M' cross-section view Fig. and this drawing (c) It is the N-N' cross-section view Fig. of this drawing (a). In addition, this cap unit 65 for colors is constituted so that rise-and-fall migration may be carried out by the drive system which consists of devices in which illustration was omitted also here, such as a rack and a pinion.

[0067] This drawing (a), (b), and (c) The cap member 66 for colors of the cap unit 65 for colors has accomplished the funnel mold with which a base inclines downward toward a center, and the waste ink recovery hole 79 is formed in the center section so that it may be shown. The waste ink recovery hole 79 is open for free passage through the waste ink flow way 81 established in the upper part of an attachment component 67 in the waste ink tube 68 connected to the edge of this waste ink flow way 81.

[0068] As mentioned above, when this cap unit 65 for colors goes up, the cap member 66 for colors closes the ink regurgitation side of the color print head unit 51 from the outside and the color print head unit 51 performs a priming, the color ink by which the priming was carried out into the cap member 66 for colors is collected by the waste ink processor section 74 shown in drawing 7 through the waste ink recovery hole 79, the waste ink flow way 81, and the waste ink tube 68. Moreover, form ***** 82 is formed in the attachment component 67 of this cap unit 65 for colors. About the function of this form ***** 82, it mentions later.

[0069] Since the cap unit 69 for black is also the almost same configuration as the above-mentioned cap unit 65 for colors, especially a point that is a little different although illustrate detail drawing and it is not explained is that form ***** 82 like the cap unit 65 for colors is not formed in the attachment component 72 of the cap unit 69 for black. Of course, although you may make it form form ***** also in the KYAPU unit 69 for black, it mentions later in detail also about this.

[0070] Drawing 9 (a), (b), and (c) It is drawing showing the operating state of the line printer 50 of a configuration of having mentioned above. In addition, the same number as drawing 7 and drawing 8 is given to the same component as the configuration which taken out and shows only the principal part required for explanation of operation in this drawing, and was shown in drawing 7 and drawing 8, and it is shown.

[0071] First, drawing 9 (a) It is full color and the operating state under printing is shown. Both the cap unit 65 for

colors and the cap unit 69 for black are descending in the downward evacuation location, and all the migration platens 56 (56-1, 56-2, 56-3) have closed them, and they form the form conveyance way with the platen stowage 57 (57-1, 57-2, 57-3). There is a black print head unit 52 which is in a fixed position above the form conveyance way, and it ranks with this further, and the color print head unit 51 which descended in the printing location approaches a form conveyance way, and is arranged.

[0072] A form (un-illustrating) is conveyed in this form conveyance on the street, color ink and black ink are breathed out towards that space from the color print head unit 51 and the black print head unit 52, and the full color image containing black is formed in a form side. Next, drawing 9 (b) The operating state under monochrome printing only by the black print head unit 52 is shown. Only the cap unit 69 for black is descending in the downward evacuation location, the black print head unit 52 is in a printing posture, and the color print head unit 51 is going up in the capping location. And capping is carried out by the cap unit 65 for colors which went up in the capping location from the lower part, and it has become hibernation.

[0073] In addition, in advance of this, the migration platen 56-1 of color print head unit 51 directly under and 56-2 are held in the platen stowage 57-1 and 57-2, a hole is opened on a form conveyance way, and the rise way of the cap unit 65 for colors is opened wide. And form ***** 82 which mentioned above the inside of the hole of a form conveyance way in the attachment component 67 of the cap unit 65 for colors which went up is formed, and as shown in drawing, when the cap unit 65 for colors goes up in a capping location, this form ***** 82 complements the hole of that above-mentioned form conveyance way, and forms the form guide section there.

[0074] By this, from a conveyance style side on the street, a form passes through the platen stowage 57-3, the migration platen 56-3, and the platen stowage 57-2, and goes into form ***** 82. It is conveyed in the same conveyance path as usual [which change does not produce in the direction of a path] of coming out from there on the platen stowage 57-1, black ink is breathed out from the black print head unit 52 towards the space, and a monochrome image is formed in a form side.

[0075] And since capping of the color print head unit 51 is carried out by the cap unit 65 for colors in the meantime, there is no need for a priming and consumption of the color ink by the priming is controlled. Drawing 9 R> 9 (c) The condition when this line printer 50 has stopped printing is shown. The color print head unit 51 is this drawing (b). Capping is carried out by the cap unit 65 for colors which went up in the capping location like the time of shown monochrome image printing, and it is set as hibernation. And capping also of the black print head unit 52 in a fixed position is carried out by the cap unit 69 for black which went up from the bottom, and it is set as hibernation. The migration platen 56-3 is held in the platen stowage 57-3, and the rise way of the cap unit 69 for black is opened wide.

[0076] Drawing 10 is drawing showing the configuration and operating state of a modification of the above-mentioned line printer 50. It differs from the case of drawing 9 that the black print head unit 52 goes up and down in a printing location and a capping location like the color print head unit 51 and that cap unit 69' for black is equipped with the same form ***** 83 as the cap unit 65 for colors with the configuration of the principal part shown in this drawing.

[0077] Drawing 10 (a) It is full color and the operating state under printing is shown. Both the cap unit 65 for colors and cap unit 69' for black were descending in the downward evacuation location, descended in the printing location where both the color print head unit 51 and the black print head unit 52 approach a form conveyance way from an upper capping location, and have taken the full color printing posture. In addition, printing actuation is drawing 9 (a). It is the same as that of a case.

[0078] Drawing 10 (b) Monochrome shows the operating state under printing. Only cap unit 69' for black is descending in the downward evacuation location, the black print head unit 52 is in a printing posture, the color print head unit 51 goes up in a capping location, and capping is carried out by the cap unit 65 for colors, and it has become hibernation. Actuation of other each part before this and next printing actuation are drawing 9 (b). It is the same as that of a case.

[0079] Next, drawing 10 (c) The condition of printing actuation peculiar to this modification is shown. The condition of this printing actuation shows the condition of performing color printing only in the yellow (Y) by the color print head unit 51 which does not mix black ink, a Magenta (M), and the color ink of three colors of cyanogen (C).

[0080] That is, it goes up in a capping location and the rise way of KYAPU unit 69' for black of a form conveyance way [directly under] is opened wide, and the black print head unit 52 complements the hole of the form conveyance way where the form ***** 83 was wide opened as the above-mentioned rise way, and forms the form guide while cap unit 69' for black goes up to a capping location and carries out capping of the black print head unit 52.

[0081] Thereby, a form is conveyed from a conveyance style side on the street via the platen stowage 57-3, form

***** 83, the platen stowage 57-2, the migration platen 56-2, 56-1, and the platen stowage 57-1. Thereby, a form is conveyed also in this case in the same conveyance path as usual [which change does not produce in the direction of a path], and the color picture which does not mix black with that space is formed.

[0082] And since capping of the black print head unit 52 is carried out by cap unit 69' for black in the meantime, there is no need for a priming and consumption of the black ink by the priming is controlled. In addition, drawing 10 (d) The condition when this line printer has stopped printing is shown.

[0083] The sense of the ink regurgitation side which is made to rotate a print head unit and serves as facing down at the time of printing may be changed, and although considered as the configuration which is made to move a print head unit or a capping unit in a longitudinal direction or the vertical direction, and performs capping actuation, you may constitute from a gestalt of the above 1st and the 2nd implementation so that capping actuation by the capping unit may be performed in the location.

[0084] Moreover, although considered as the configuration which processes by using as waste ink the ink by which the priming was carried out into the cap member with the gestalt of the 2nd operation, it is good also as a configuration collected and reused.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the configuration of the line printer of the 1st operation gestalt typically.

[Drawing 2] It is the decomposition perspective view of the black print head unit of the same configuration of being used for the line printer of the 1st operation gestalt, or a color print head unit.

[Drawing 3] (a) Drawing and (b) which show the ink regurgitation side of the element chip used for a ** black print head unit or a color print head unit It is drawing showing the rear face.

[Drawing 4] (a), (b), and (c) It is drawing showing typically the operating state of the line printer of the 1st operation gestalt.

[Drawing 5] (a) - (d) It is drawing showing the modification of the line printer of the 1st operation gestalt.

[Drawing 6] It is drawing showing the modification of the element chip of the black print head unit of the line printer of the 1st operation gestalt.

[Drawing 7] It is the sectional side elevation showing the configuration of the line printer of the 2nd operation gestalt typically.

[Drawing 8] (a) The perspective view and (b) which show the configuration of the cap unit for colors in the operation gestalt of **** 2 more to a detail (a) A M-M' cross-section view Fig. and (c) (a) It is a N-N' cross-section view Fig.

[Drawing 9] (a), (b), and (c) It is drawing showing the operating state of the line printer of the 2nd operation gestalt.

[Drawing 10] It is drawing showing the 2nd configuration and operating state of a modification of an operation gestalt. [of a line printer]

[Drawing 11] (a) The top view and (b) which show the ink regurgitation side of the print head of ***** The rear view and (c) (a) The enlarged drawing and (d) which see through the top plate of the part enclosed with a broken line a, and show the interior It is the A-A' cross-section view Fig. of (c).

[Drawing 12] It is drawing showing typically the configuration of the color print head of the conventional Rhine style ink jet printer.

[Description of Notations]

- 1 Print Head
- 2 Nozzle Train
- 3 Regurgitation Nozzle
- 4 Chip Substrate
- 5 Drive Circuit
- 5-1 Circuit Electrode Terminal
- 6 Ink Supply Slot
- 7 Ink Feed Holes
- 8 Exoergic Section
- 9 Common Electrode
- 11 Individual Wiring Electrode
- 12 Electrode Terminal for Connection
- 13 Septum
- 13-1, 13-2 Seal septum

13-3 Batch Septum
14 Ink Pressurized Room
15 Ink Passage
16 Top Plate
17 Color Print Head
18 Element Chip
19 Parent Substrate
20 Line Printer
21 Black Print Head Unit
22 Color Print Head Unit
23 Head Unit Holder for Black
24 Head Unit Holder for Colors
25 Cap Member for Black Print Heads
26 Cap Member for Color Print Heads
27 Guide Shaft
28 Driving Belt
29 Sliding Mechanism
31 Platen Plate
32 Driving Roller
33 Follower Roller
34 Form
35 Form Conveyance Belt
36 FPC (Flexible Substrate)
37 Positioning Fixed Plate
38 38' Element chip
39 Ink Feed Holes
41 Free Passage Hole
42 Adhesion Pad 43 Ink Passage Member
44 Ink Tank
45a, 45b, 45c Ink reservoir room
46 Ink Regurgitation Side
47 (47-1, 47-2, 47-3) Nozzle train
48 Regurgitation Nozzle
49 Connection Terminal
50 Line Printer
51 Color Print Head Unit
52 Black Print Head Unit
53 Spring
54 (54-1, 54-2, 54-3, 54-4) Ink tank
55 Ink Supply Tube
56 (56-1, 56-2, 56-3) Migration platen
57 (57-1, 57-2, 57-3) Platen stowage
58 Conveyance Roller Pair
59 Feed Roller
61 Paper Tray
62 Delivery Roller Pair
63 Delivery Opening
64 Paper Output Tray
65 Cap Unit for Colors
66 Cap Member for Colors
67 Attachment Component

68 Waste Ink Tube
69 Cap Unit for Black
71 Cap Member for Black
72 Attachment Component
73 Waste Ink Tube
74 Waste Ink Processor Section
75 76 Wiper member
77 78 Slide shaft
79 Waste Ink Recovery Hole
81 Waste Ink Flow Way
82 83 Form *****

[Translation done.]

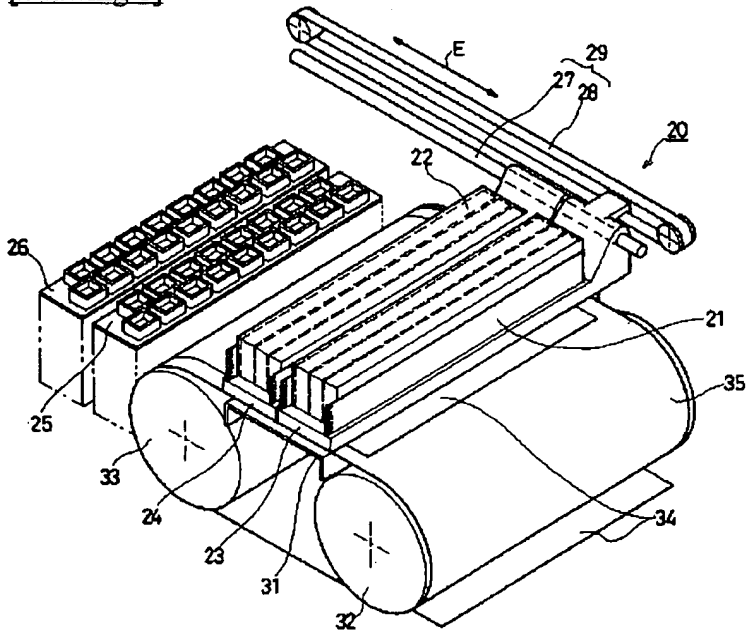
* NOTICES *

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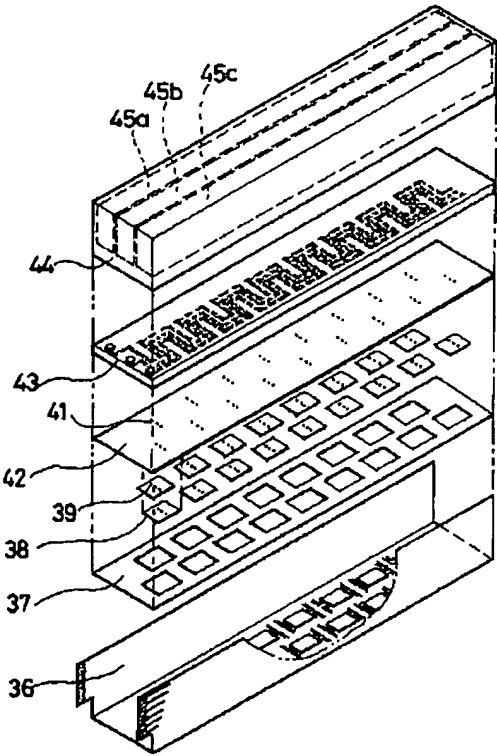
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

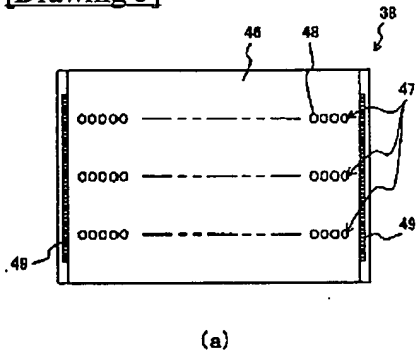
[Drawing 1]



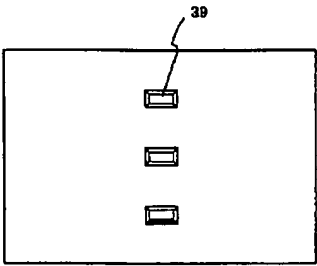
[Drawing 2]



[Drawing 3]

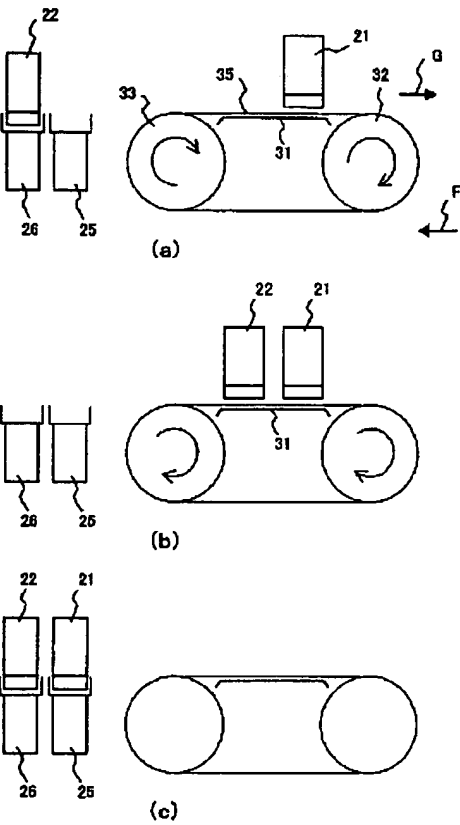


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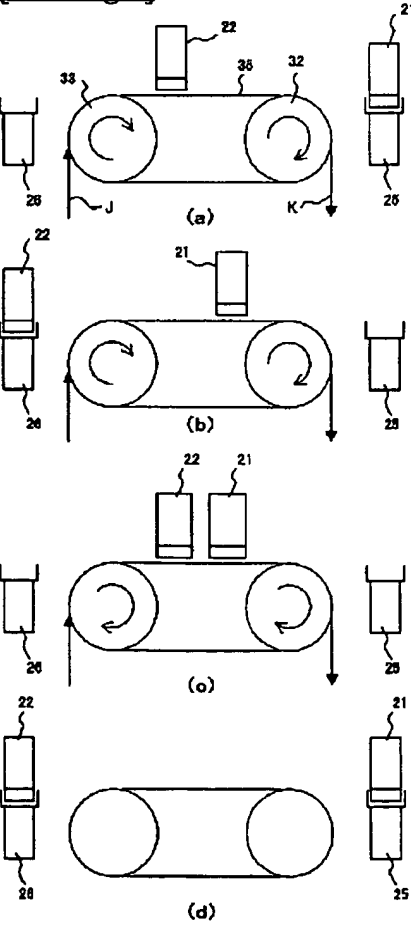


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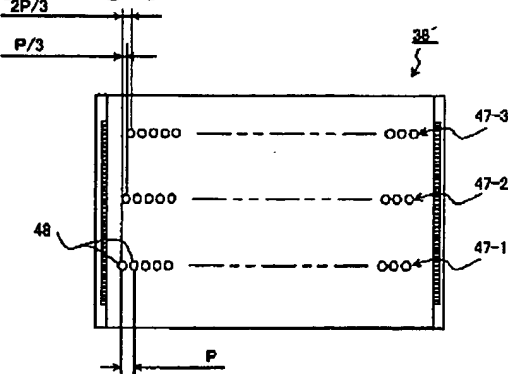
[Drawing 4]



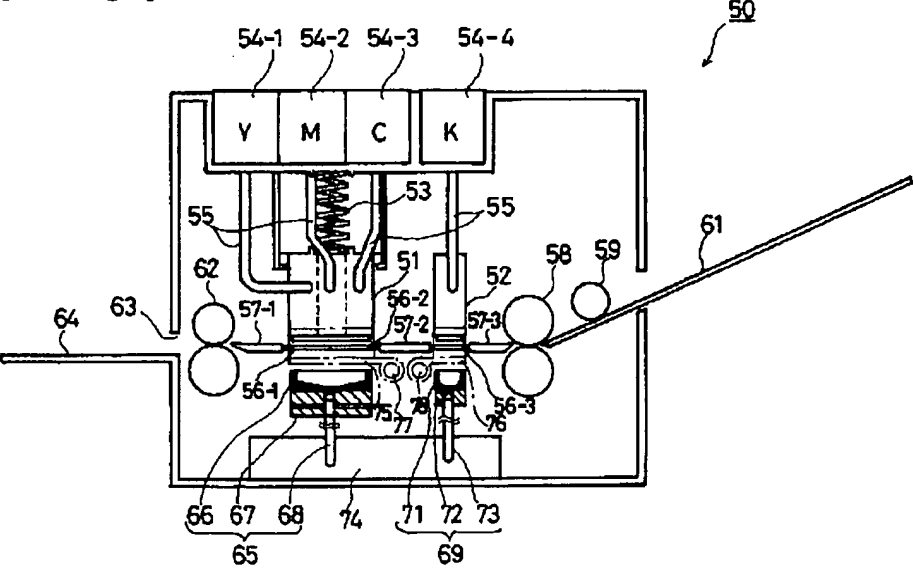
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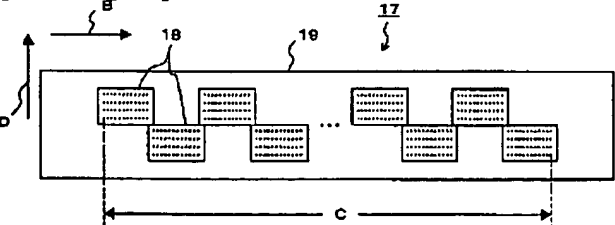
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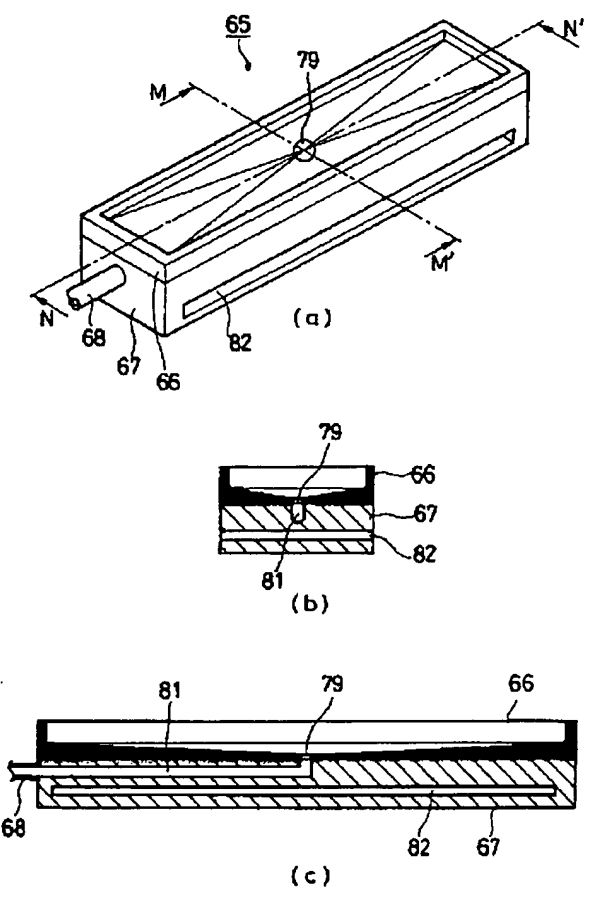
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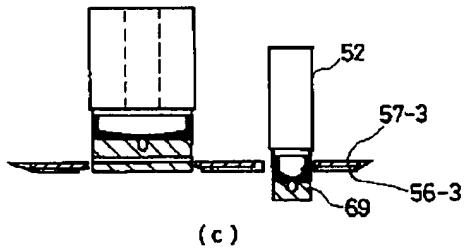
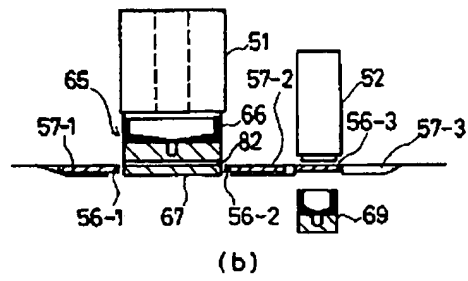
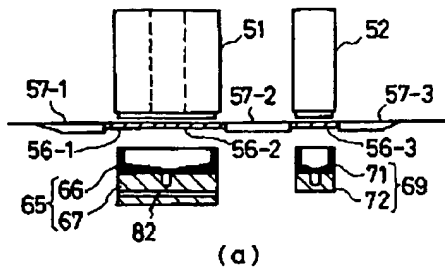
[Drawing 12]



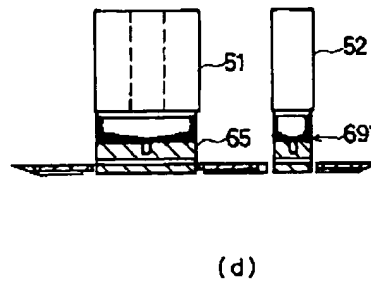
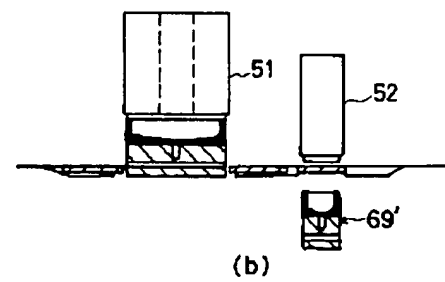
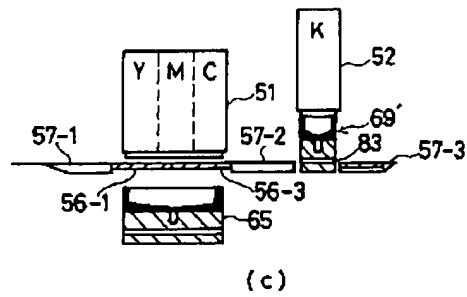
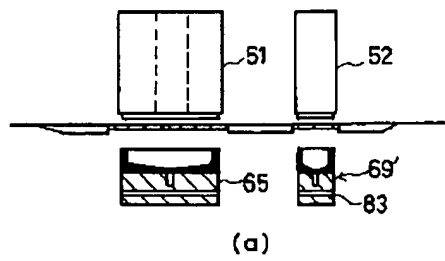
[Drawing 8]



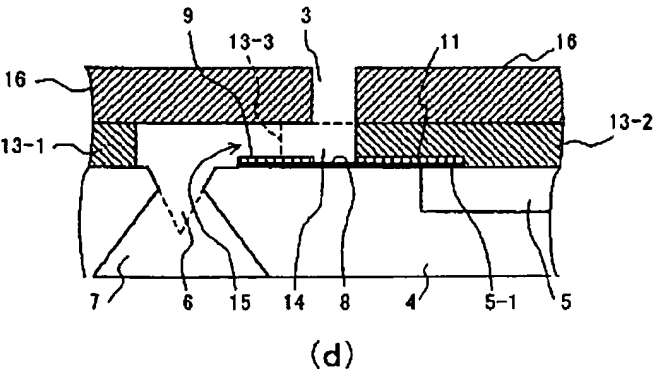
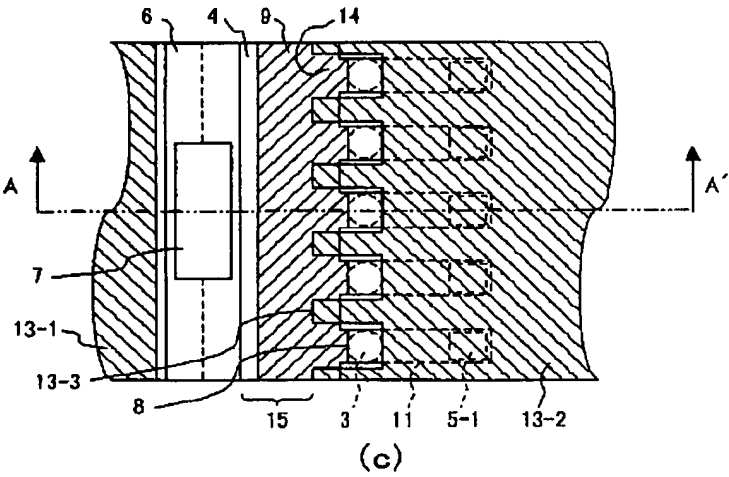
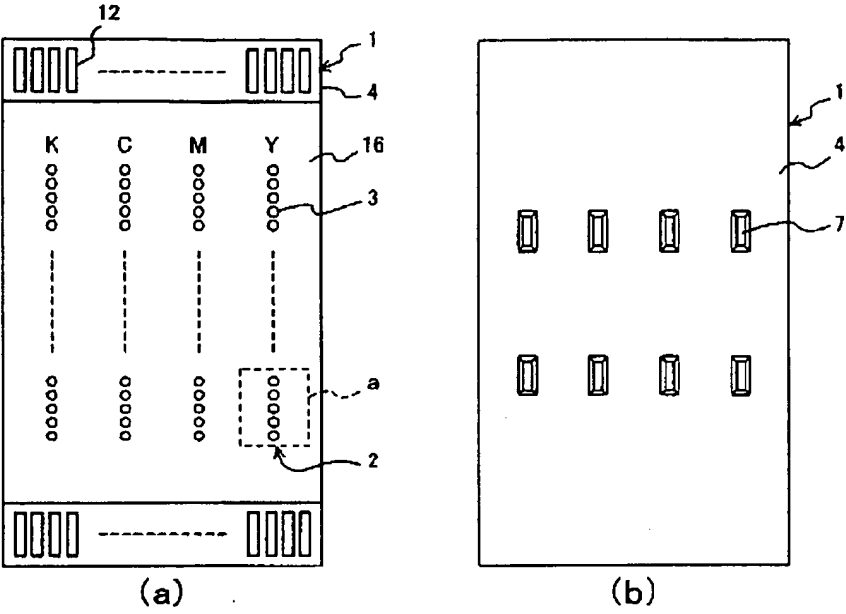
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]